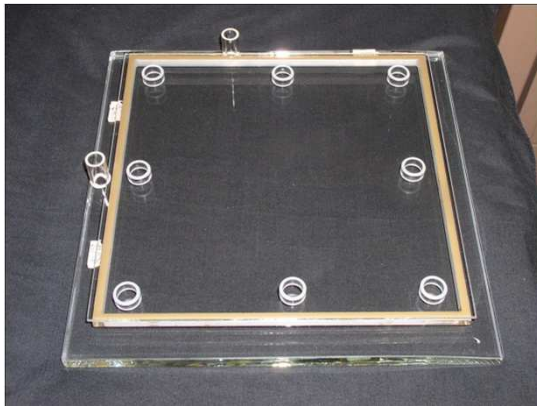


Hermetic Packaging and the Tile Factory

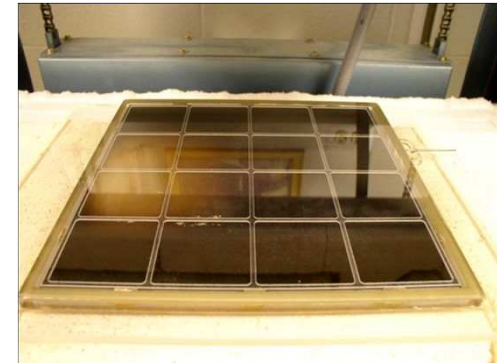
Dean R. Walters
Argonne National Laboratory

Hermetic Sealing - Frit seal Anode to Side-wall

- Frit seal Anode to Side-wall



Tooling for Anode to Side-wall



Sealed box with MCP's



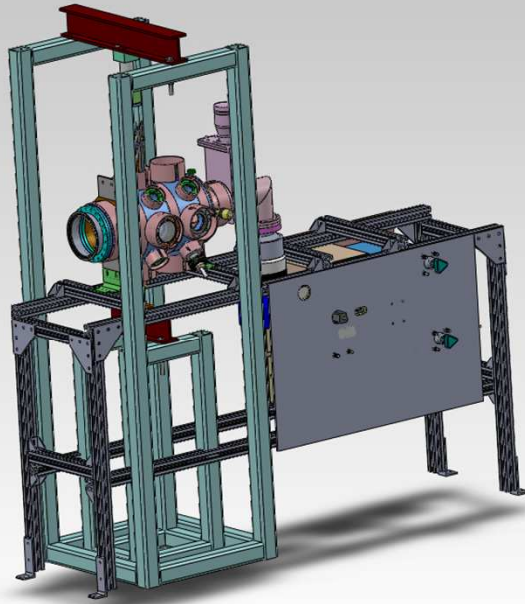
Sealed box to be pumped-down



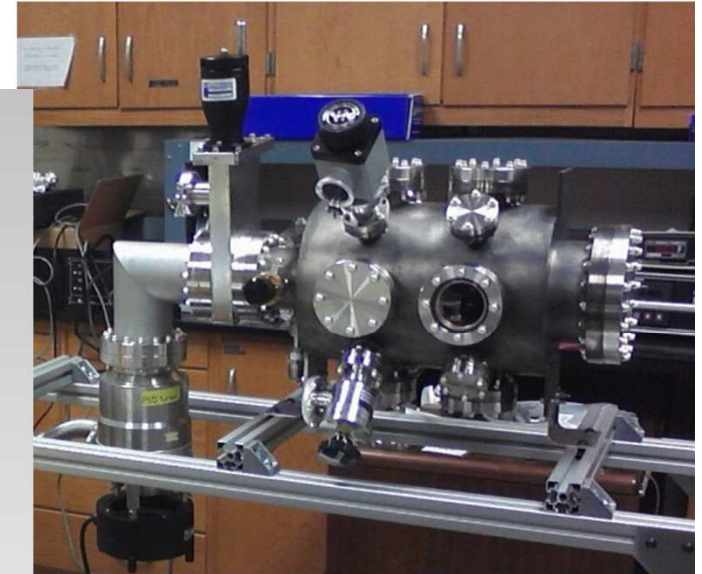
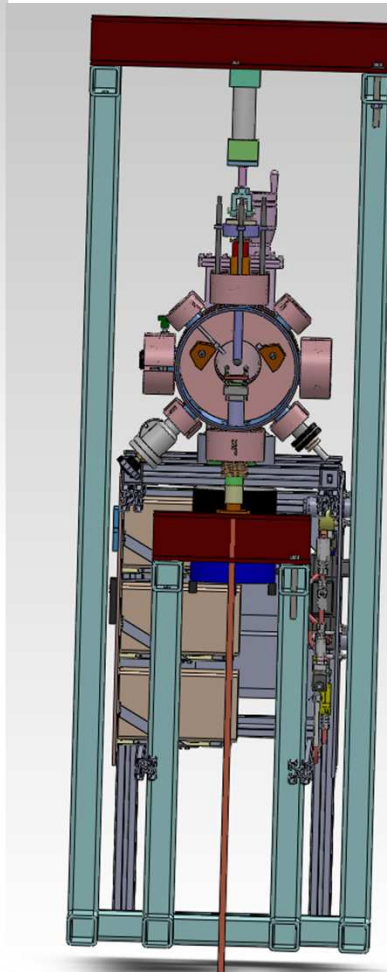
Sealed box with Al photocathode

Work performed by J. Gregar

Hermetic Sealing - Top Seal



- Progress to date been with In-Sn filler material.
- A system is being assembled that will be able to produce joints in vacuum, elevated temperatures, and compression.
- System will be in use, Phase 1, in a month. Phase 2 with the hydraulic compression will operational 2 months after that.



Seal made using Ag-coated glass and In52/Sn48 as filler materials.

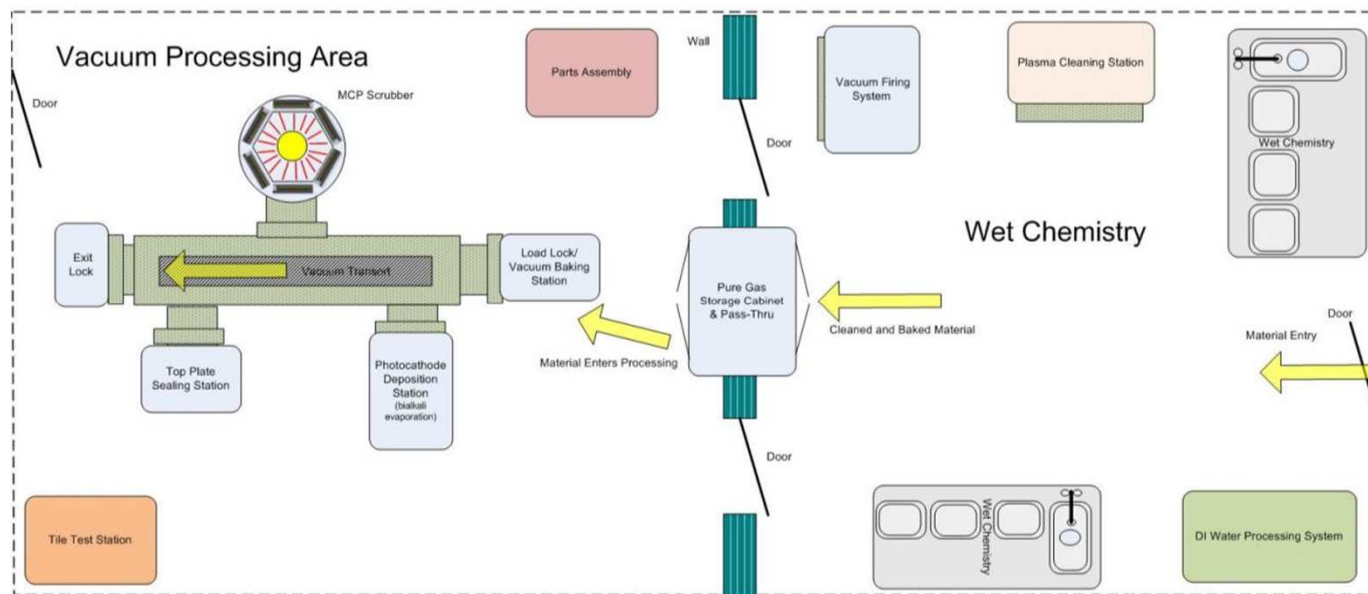
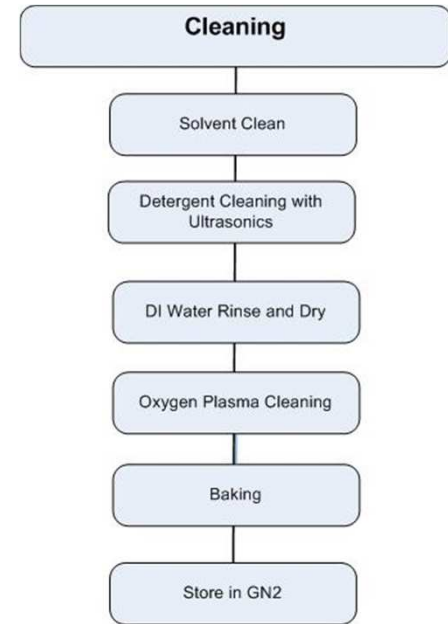
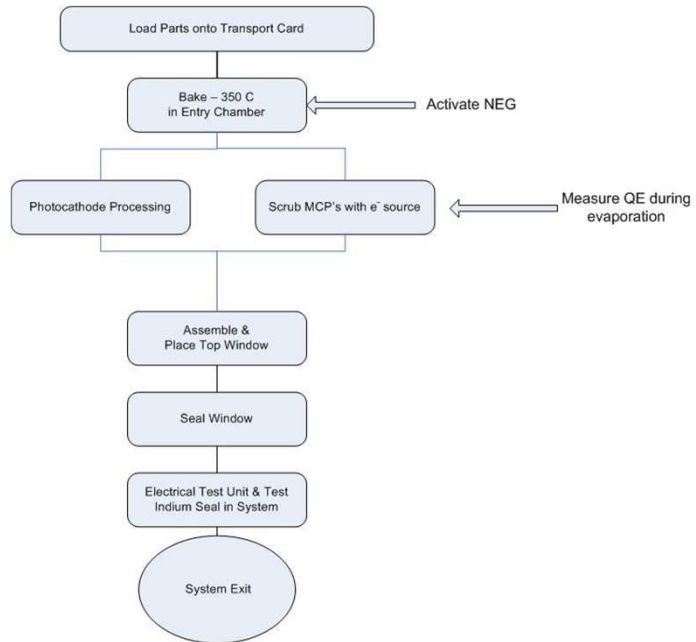
Work performed by M. Kupfer (UIC)

Introduction

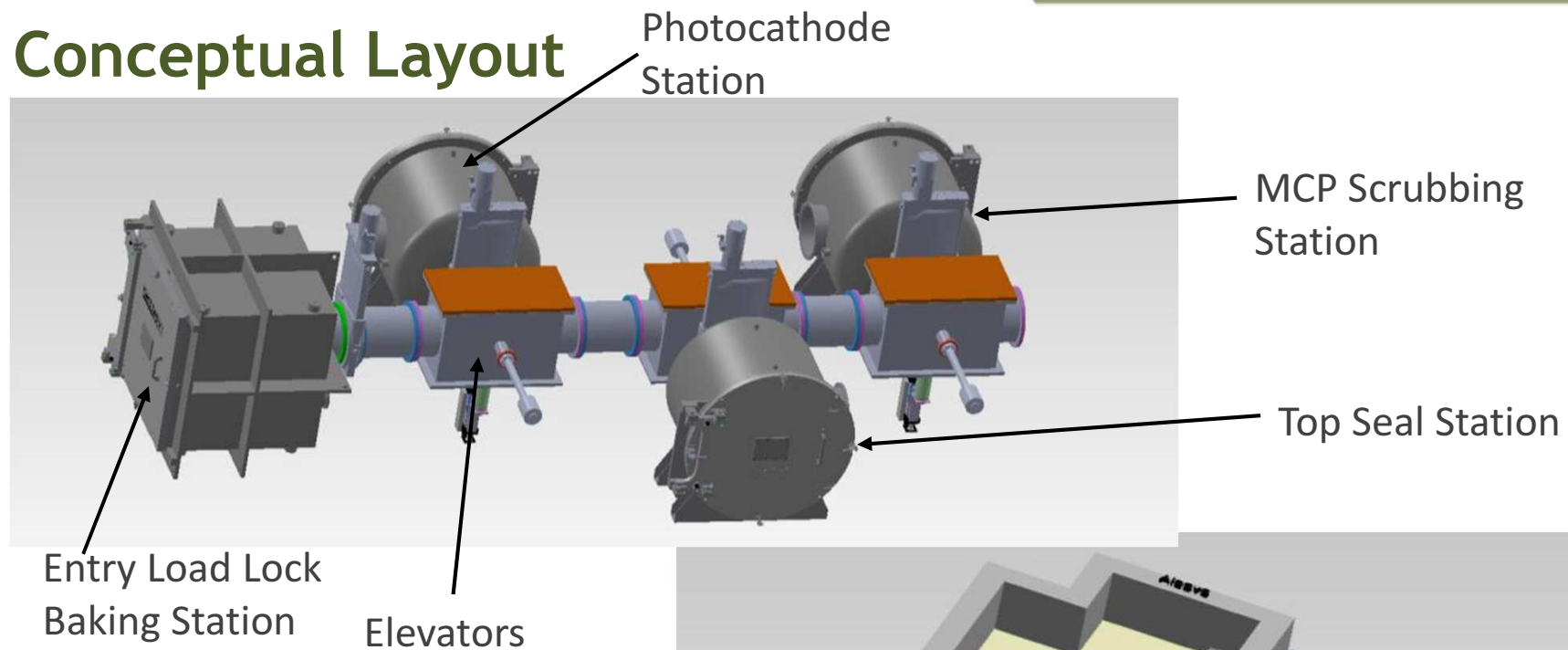
- Laboratory Objective
 - Provide a facility for fabrication of glass tile photo-detectors.
 - The facility will have the capacity to make batches of photo-detectors in a reproducible environment.
 - The equipment will have the ability to be upgraded as the requirements change.
 - The equipment's sample interface will be standardized to allow multiple sample shapes to be processed within the system.
 - The process sub-systems will be manufactured by outside companies to leverage their process knowledge.
- Long term goals of the lab
 - Fabrication of a variety of photo-detector designs
 - Collaborations with outside organizations to construct non-ANL designs.
 - This laboratory is intended to be the go-between single glass tiles and large scale production. The complexity of making a re-producible photo-detector in small batches will be studied here.
 - Ability to aid our industrial partners with facility to try out design and process changes mandated in the change over to large scale production.



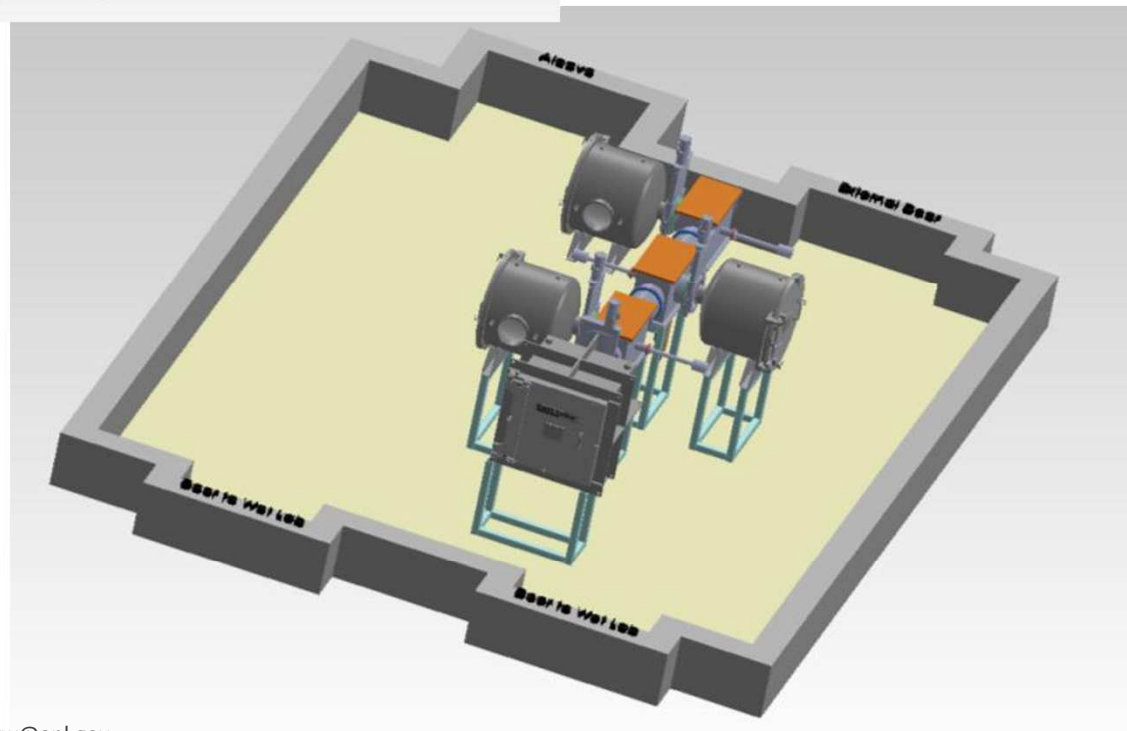
Material Flow in Labs A/C -248



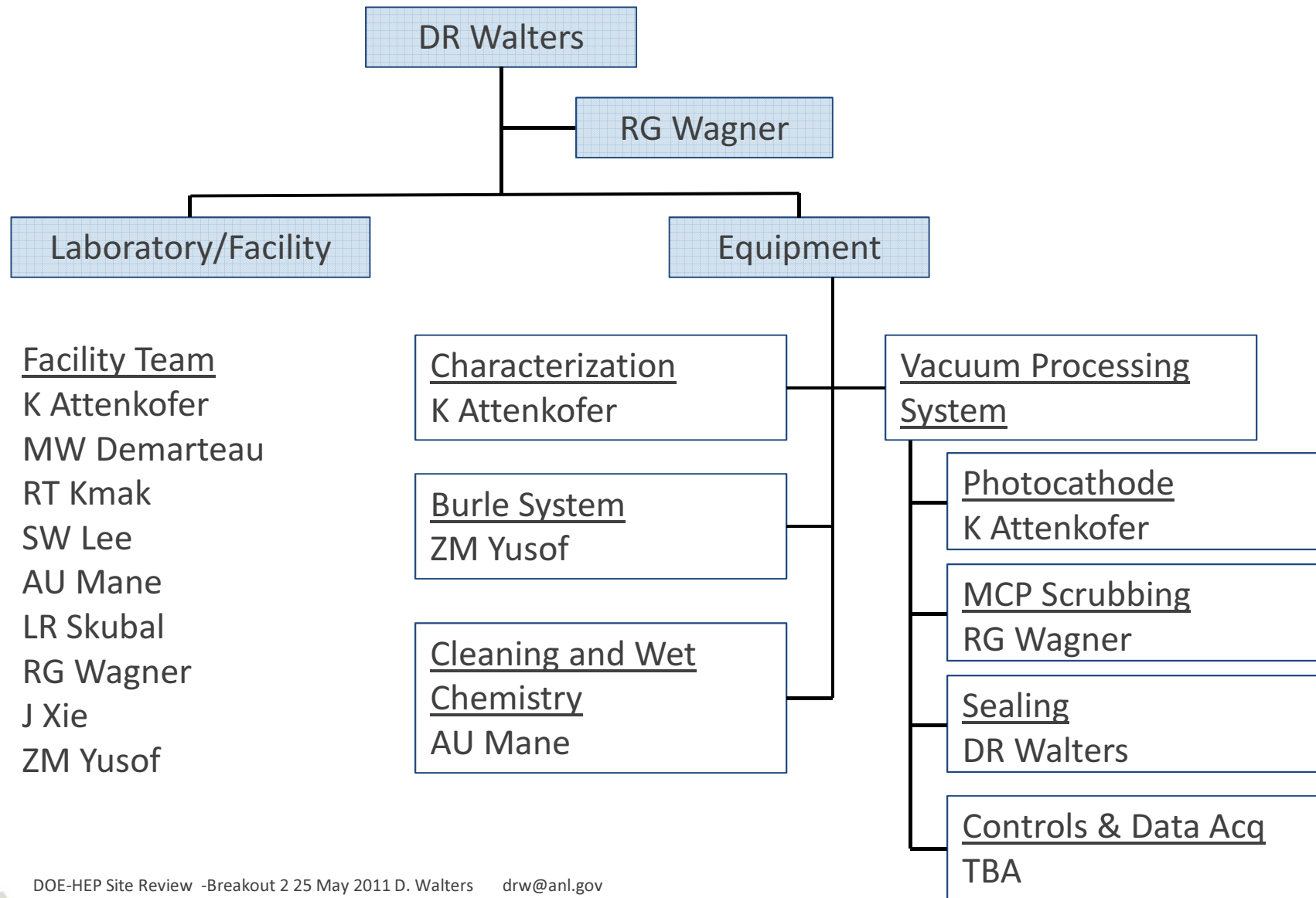
Conceptual Layout



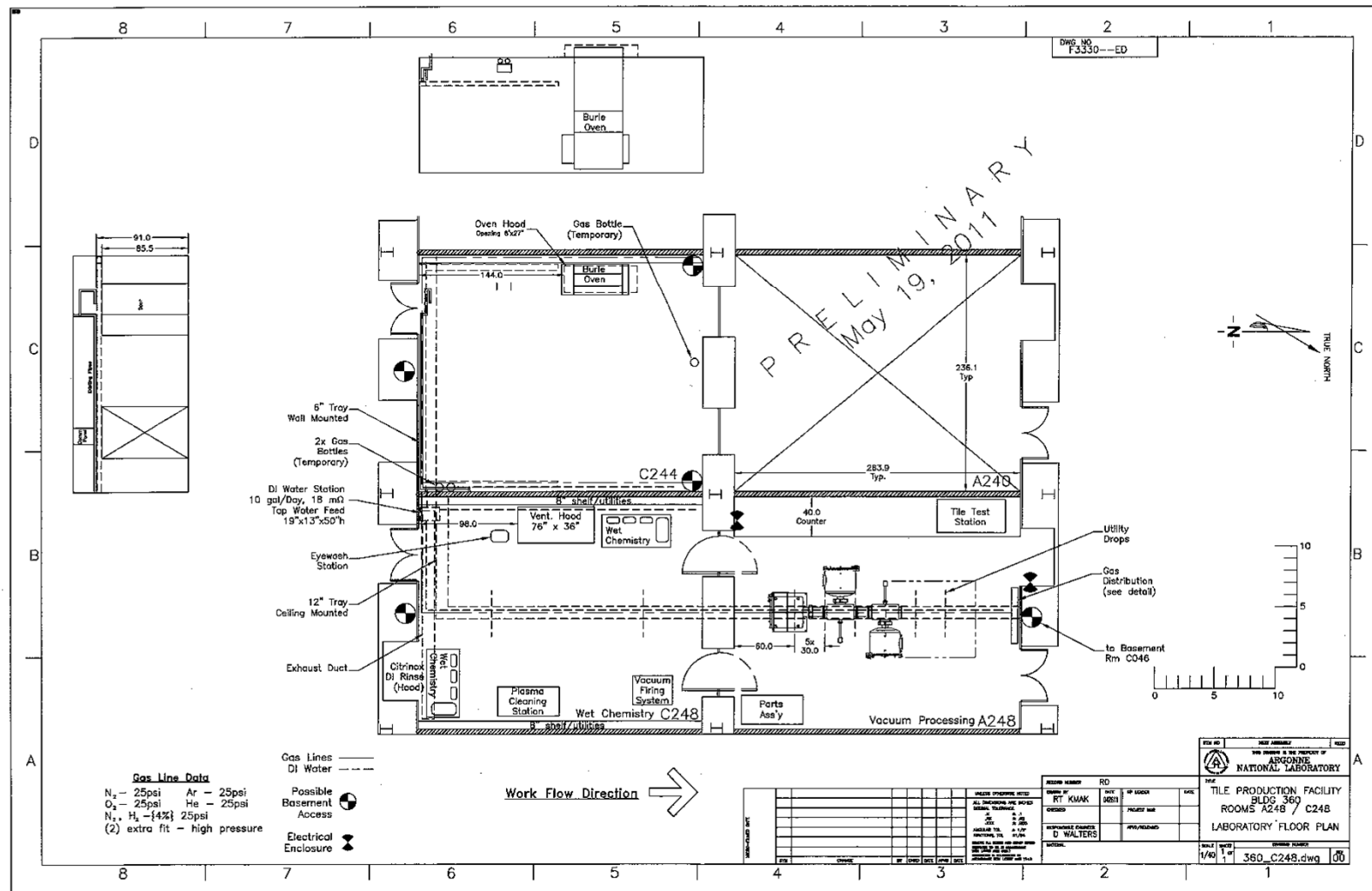
Picture courtesy of M. Ackeret of Transfer Engineering Inc.



Organization



Laboratory Facilities Layout



Facility Progress

- R. Wagner and crew have started the work of removing equipment and reconditioning the laboratories
 - Photocathode Lab
 - Asbestos floor tiles removed
 - New flooring with sealer installed
 - Install glove box
 - Begin assembling characterization system
 - Install Burle photocathode system
 - Wet Lab
 - Cabinets removed
 - Waste disposal log system in place
 - In process of cleaning up purchased vacuum chambers
 - Vacuum Processing Lab
 - Cabinets removed
 - Overhead ducting removed and sealed off
 - Basement (for utilities)
 - Located cage area for gas bottle farm
 - Located 4" conduit which will house water/gas lines
 - Located main electrical transformers



Laboratory Progress

- Pictures Before



- Pictures After



Estimated Cost of Equipment and Facility

- Laboratory Upgrade
 - Gas racks, manifolds, piping, and purification
 - Water purification, ultrasonic baths, pure gas storage
 - Plasma asher and vacuum pump
 - Total cost : \$130, 000
- Vacuum Processing Equipment
 - Entry Load Lock – Heating Sub-system : \$70,000
 - (2)Scrubbing Sub-system : \$241,000 each
 - Photocathode Sub-system : \$183,000
 - Top Sealing Sub-system : \$80,000
 - (3) Elevators : \$45,000 each
 - Total Cost : \$950,000
- Overall Total : \$1,080,000



Estimated Facility & Equipment Schedule

- Wet Lab Plans
 - Walls and floors 2 months
 - Overhead tray purchase and installation 1 month
 - Install DI water distribution manifolds 2 months
- Wet Lab Equipment Plans
 - Purchase ultra-sonic cleaners 1 month
 - Purchase DI water conditioning system 2-3 months
 - Vacuum bakeout oven 2-4 months
 - Oxygen plasma ashing system 1-2 months
- Vacuum Processing Lab Plans
 - Gas junction manifolds 2-3 months
 - Install gas and water piping system 1-2 months
- Vacuum Processing Equipment Plans
 - Sampling handling conceptual design 3-4 months
 - Entry/Heater conceptual design 4-5 months
 - Scrubbing station conceptual design 4-5 months
 - Sealing station conceptual design 4-5 months
 - Send sub-stations out for bid 2 months
 - Purchase sub-stations 7 months
 - Integrate into laboratory 1 month
- Utilities Plans
 - Obtain control of cage 1-2 months
 - Gas bottle farm supports and manifolds 1-2 months
 - Purchase central vacuum pump 1-3 months
- **Total Duration is 18 months**



Conclusions

- Hermetic Sealing
 - The glass frit seal has become a reliable and repeatable seal.
 - The frit seal has been demonstrated on full sized parts using tooling designed at ANL.
 - The low temperature top seal continues with its development.
 - One filler material has shown promise for this application and another one is being investigated.
 - Further work is being pursued at ANL to determine a robust and repeatable seal.
- Laboratory Facility
 - Work has begun on the facility for the construction of glass tile photo-detectors.
 - In a short amount of time the facility spaces have been upgraded and cleaned to prepare for future work.
 - An organization has been identified.
 - A cost estimate has been compiled
 - Finally, a schedule has been constructed.

